If…then statements

If A then B

The if…then statements is a **conditional** **statement**. B “requires” A to happen. This establishes a **conditional** **relationship**.

A **proof** is a formal justification of a hypothesis.

A **hypothesis** is a possible explanation for an observation that has yet to be established as fact.

Learning how to apply conditional statements requires knowledge of **definitions**, **postulates**, **properties** and **theorems**.

**Definition**: a description that defines an object or relationship. For example, “congruent angles are angles which have the same measurements.”

**Postulates**: statements of fact that require no proof. They are accepted as already established or proven.

**Properties**: facts and relationships held by an object or collection. For example, “the symmetric property of real numbers states that if a = b then b = a.

**Theorems**: a hypothesis that has been (or can be) established by proof. For example, “theorem 2.1, properties of segment congruence, says that (in part) if ≅ and ≅ then ≅ .

How to use if…then statements in a two-column proof:

Show that if Fido is a beagle then Fido is a mammal.

|  |  |
| --- | --- |
| **Statement** | **Reason (justification)** |
| Fido is a beagle | Given |
| Fido is a dog | If something is a beagle then it is a dog. |
| Fido is a mammal | If something is a dog then it is a mammal. |

Components of a proof:

Given statement(s): what we know (or can assume) to be true.

(To) prove: what needs to be established by proof.

Diagram: a picture of what is given and what needs to be proven.

The proof: a series of logical statements justified by established facts that leads to the statement needing to be proven. Each statement in a proof must logically follow from the previous statement. No assumptions can be made.

The final statement in a proof establishes what you are trying to prove.